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A NEW MYZOSTOMA, PARASITIC IN A STARFISH.

WILLIAM MORTON WHEELER.

Mr. Walter K. Fisher, editor of *The Condor*, recently sent me a *Myzostoma* which he took from the coelomic cavity of a new species of starfish, *Tosia (Pentagonaster) leptoceramus* Fisher, from Station 4427 off the coast of southern California. The starfish is an extremely flat species and the myzostome was situated in one of the interradial areas, near the gonad, where the body of the host was only 1.5 mm. thick. The parasite appeared to be loosely fastened to the coelomic epithelium by one end and was greatly flattened, in adaptation to the narrow body-cavity of the starfish.

Comparison of the specimen with the descriptions of the only other known starfish *Myzostoma (M. asteriae)* shows so many differences that I do not hesitate to regard the Californian species as distinct. *M. asteriae*, originally described by von Marenzeller,¹ occurs in an hypertrophied portion of the digestive tract in the base of one of the arms of certain small starfishes (*Asterias richardi* E. Perr. and *Stolasterias neglecta* E. Perr.) that have been dredged from a depth of 160–710 meters in the eastern Mediterranean.² A very careful anatomical and histological study of this species has been recently published by von Stummer-Traunfels³ so that it is an easy matter to compare the Californian with the Mediterranean species.

MYZOSTOMA FISHERI sp. nov.

The specimen is white. It resembles *M. asteriae* in size and form, being elliptical and broader than long. It measures 6 mm. in length and 8.5

¹ "Myzostoma asteriae n. sp., ein Endoparasit von Asterias-Arten," *Anzeig. k. Akad. Wiss. Wien.*, No. 18, Juli, 1895.

² von Marenzeller, E. "Berichte der Kommission für Tiefseeforschungen, XVI., Zoolog. Ergebnisse. V. Echinodermen," *Denkschr. d. math. naturw. Kl. d. k. Akad. Wiss. Wien.*, 62 Bd., 1895, pp. 123–148, 1 Taf.

³ "Beiträge zur Anatomie und Histologie der Myzostomen : I. Myzostoma asteriae Marenz." *Arb. a. d. Zool. Inst. zu Graz*, 6. Bd., No. 8, 1903, pp. 263–363, Taf. 34–38.

mm. in breadth. The dorso-ventral diameter is only 0.5 mm., and is rather uniform both in the center and at the edge of the body. There are no traces of cirri along the somewhat undulating margin. The five pairs of parapodia (*pm.*) are very small and vestigial. They are neither retracted nor do they project above the ventral surface of the body, although they have distinct setæ. The lateral organs ("segmental sacs") are very small, but clearly developed. A ninth unpaired organ could not be de-

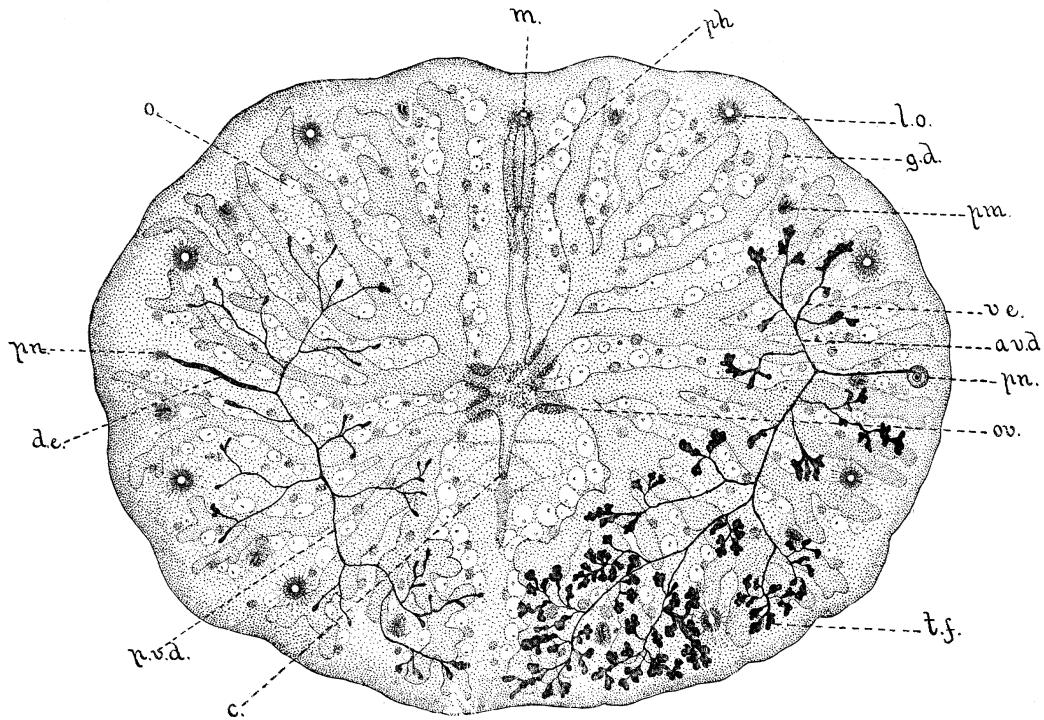


FIG. A. *Myzostoma fisheri* sp. nov. Ventral aspect. *m.*, mouth; *ph.*, pharynx; *g.d.*, gut diverticulum; *c.*, cloacal orifice (on dorsal surface); *l.o.*, lateral organ; *pm.*, parapodium; *pn.*, penis; *d.e.*, ductus ejaculatorius; *a.v.d.*, anterior vas deferens; *p.v.d.*, posterior vas deferens; *v.e.*, vas efferens; *t.f.*, testicular follicles; *ov.*, ovaries; *o.*, mature ovum.

tected. The oral orifice is on the ventral surface and rather near the anterior margin, the cloacal orifice on the dorsal surface a short distance behind the center of the body. The pharynx is well developed, the stomach, or succeeding portion of the alimentary tract, is very long and gives off on either side near its posterior end two main gut diverticula. These subdivide near their bases and again near their tips (*g.d.*). All these diverticula are robust, well-developed and extend to very near the margin of the body. The ovary (*ov.*) is located in the body cavity, to the floor of which it is at-

tached, on the dorsal surface of the stomach. It is in a very active stage of proliferating the cell-triads (young oöcytes with their attendant nurse-cells). It is a single, unpaired organ of somewhat irregularly cruciform outline when seen in the entire stained and cleared specimen. The body-cavity which is developed only on the dorsal side of the gut-diverticula and accompanies them in their ramifications, contains numerous ova (*o.*) in all stages of growth, attached to the much flattened peritoneal epithelium. The male reproductive organs present a very interesting structure and are in different stages of development on the two sides of the body. On the left side (right side of figure) these organs are highly developed and in full activity, whereas on the left they are much atrophied. Each consists of a penis (*pn.*) which has the form of a small conical papilla on the left, but has all but disappeared on the right side, a *ductus ejaculatorius* (*d.e.*) which extends medially and divides into a shorter anterior and longer posterior vas deferens (*a.v.d.* and *p.v.d.*). Each of the *vasa deferentia* again divides into slender *vasa efferentia* (*v.e.*) which terminate in the testicular follicles (*t.f.*), well-developed and still containing mature spermatozoa on the left side of the body, but exhausted and vestigial on the right. The ducts and nearly all the follicles are situated on the ventral side of the gut-diverticula. The specimen may be interpreted, in conformity with my views on the sexual phases of *Myzostoma*, as about to pass from the functional hermaphroditic to the purely female adult stage.¹

The nephridia, "uterus" and cloaca resemble the corresponding structures in *M. asteriae* as figured by von Stummer-Traufels (Taf. 34, figs. 4-9). The short, curved nephridia open on either side by means of distinct nephrostomes into the "uterus" (median body cavity) and by means of their nephridiopores into the cloaca, there being no unpaired end-piece as in some other species of *Myzostoma*. The cloaca is, however, much shorter than in *M. asteriae*. The "uterus" opens into it very near its orifice on the dorsal surface of the body. The lateral organs also resemble those of *M. asteriae* in histological structure. The musculature of the body and parapodia is very feebly developed, but the mesenchyma of the former is abundant. The ventral nerve-ganglion lies in the middle of the body beneath the stomach as in other myzostomes. It, too, is very small compared with the nerve-ganglion of *M. asteriae*.

¹ These views on the protandric and hysterogynic nature of *Myzostoma*, advanced in my papers entitled : "Protandric Hermaphroditism in *Myzostoma*," *Zool. Anzeig.*, No. 447, 17, Jahr. 9, pp. 178-182; and "The Sexual Phases of *Myzostoma*," *Mittb. Zool. Staz. Neapel.*, 17 Bd., 2 Heft, 1896, pp. 227-302, Taf. 10-12; gave rise some years ago to an unpleasant controversy with John Beard, who persisted in maintaining the existence of complemental males among the Myzostomidae. It is a great pleasure, after the lapse of a decade, to find that my views have been completely confirmed by so careful an investigator as von Stummer-Traufels. In a forthcoming paper on several new species of *Myzostoma* I shall produce still further proof of the correctness of my contention.

It is evident that *M. asteriae* and *M. fisheri* are in many respects much more closely related to each other than to any other described species of the genus. Both species agree in the flattened, transversely elliptical form, complete absence of cirri, diffuse ramification of the male reproductive organs, position of the ovary and cloacal orifice, structure of nephridia, etc. On the other hand, they differ in the following important characters : (1) *M. fisheri* is white, whereas *Asteriae* is buff-colored ; (2) the parapodia of the former species do not project above the surface of the body and are very much smaller than they are in the latter ; (3) the lateral organs, too, are very much smaller in *fisheri* than in *asteriae* and there is no ninth unpaired organ in the former species ; (4) the pharynx of *fisheri* is much longer, the mouth nearer the anterior edge of the body ; the gut diverticula are more robust and less branched at their tips ; (5) in *asteriae* the testes and their ducts are very differently arranged. They are not largely confined to the posterior half of the body, the ducts are much more robust than the terminal follicles (to judge from v. Stummer-Traunfels' Fig. 10, Pl. 34) and there are not two main *vasa deferentia* ; (6) the ovary of *asteriae* is paired, that of *fisheri* unpaired ; (7) the Mediterranean species lives in the alimentary tract, the Californian species in the body cavity of the starfish. In this respect *fisheri* is quite unique among the known myzostomes. The other species of the group are either free ectoparasites on crinoids, like *M. cirriferum*, or inhabit the pharynx of their host (*M. pulvinar*) or its gut diverticula (*M. asteriae*) or live in cysts or galls which they produce in its body wall or skeleton (*M. cysticolum* et al.). In his letters Mr. Fisher is quite explicit in regard to the position of *M. fisheri* in the coelomic cavity of its host, so that there can be little doubt about the fact.

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